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REBUILDING AGRICULTURAL MARKETS PROGRAM (RAMP)

ECONOMIC IMPACT ASSESSMENT

June 2006

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ECONOMIC IMPACT ASSESSMENT

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EXECUTIVE SUMMARY

This is an ex-post impact internal assessment of the USAID/Afghanistan's $145 million Rebuilding Agricultural Markets Program (RAMP) implemented by Chemonics International from July 2003 to July 2006. The monitoring and evaluation department of RAMP conducted an internal assessment of the project and measured the monetary value of the development impact. The assessment was done, to the extent possible, with the participation of implementing partners subcontracted through RAMP's Job Order mechanism.

RAMP's strategic objective was to implement activities to increase the marketable value of the following five priority commodity groups by $250 million: (1) Wheat and Food Grains, (2) Fresh and Dried Vegetables, (3) Fresh and Dried Fruit, (4) Livestock and Poultry, and (5) Nuts. The marketable value of an agricultural commodity is a factor of its productive yield and the amount of value added through processing and marketing activities. RAMP's major activities included dissemination of agriculture technology, marketing, pest control and veterinary services backed by rehabilitation of rural infrastructure – farm-to-market roads and rehabilitation of irrigation systems – and financial services for micro credit and small-and-medium enterprise development.

The program partnered with 27 local and 36 international subcontractors and grantees to implement these activities. Afghanistan's Ministry of Agriculture and Irrigation (MAI) played a significant role in facilitating as well as implementing certain discrete activities.

The net impact of RAMP on the five aforementioned priority commodity groups is US$1.646 billion – expressing a return on investment ratio of 11:1. Many of RAMP's activities, particularly those focused on road rehabilitation and irrigation also benefited other agricultural products not included in the priority commodity group. In consideration of these benefits, RAMP's cumulative economic impact is estimated at US$1.746 billion. This has a significant macro economic implication for a country that is just emerging from years of war and drought. The following table illustrates RAMP's contractual targets and actual impact in increasing the marketable value of each priority commodity group.

Commodity Group	Contract Targets	Actual Impact	Percent of Total
Wheat & food grains	$30 Million	$623 Million	38%
Fresh & dried vegetables	$20 Million	$482 Million	29%
Fresh & dried fruit	$100 Million	$266 Million	16%
Livestock & poultry	$50 Million	$257 Million	16%
Nuts	$50 Million	$16 Million	1%
Totals:	**$250 Million**	**$1,646 Million**	**100%**

I. BACKGROUND AND CONTEXT

Agriculture is the principle sector of the Afghan economy. It provides employment to over 80 percent of the population and generates about half the GDP. However, war and persistent conflicts since the 1970s has resulted in virtually no growth in the sector up until the late 1990s. Today, Afghanistan remains one of the poorest countries in the world. The infrastructure for production and marketing remains in ruin. Markets are fragmented and localized with up to 20% of the output damaged while transported to markets due to poor roads. Product quality is low, as farmers are not familiar with grading standards, and seed stock has genetically deteriorated over the years. Afghan dried fruits and nuts, mainly raisins, apricots, almonds, pistachios, and walnuts used to account for up to 60% of the world market in the 1960s and 1970s. This comparative advantage was all but lost, and has to be revived. At the same time, the Afghan population has risen from 15 million in the 1970s to approximately 25 million in 2006, leading to a corresponding decline in per capita food availability. From being near self-sufficient in food production in the late 1970s, Afghanistan has become a food deficit country. Even in good years many households are not able to grow enough food to sustain their members. A National Risk and Vulnerability Survey conducted in 2003 estimated that 3.5 million of the 17.5 million Afghans living in rural areas suffer from extreme poverty and another 10.5 million are vulnerable to it. An estimated 48% of the children under 5 are thought to be malnourished and suffer from stunted growth – twice more than its neighboring countries and Sub-Saharan Africa and almost three times higher than the average for developing countries.

Economic growth is a crucial element of any strategy to improve the well-being of Afghans. Agriculture is the most important sector that can drive the economy. It has to grow faster to ensure food security, incomes and employment. In July 2003, Chemonics International, Inc. (Chemonics) began implementing a contract issued by the U.S. Agency for International Development (USAID) in Afghanistan under its Rebuilding Agricultural Markets Program (RAMP). RAMP encapsulates USAID/Afghanistan's strategy to help the people and Government of Afghanistan rehabilitate the agriculture sector. The project aimed at enhancing food security and incomes of the rural population through a multi-pronged approach. It had two principal objectives: a) increased agricultural output for food security and incomes, and b) increased marketing of output by developing effective marketing structures and by linking producers with processors and exporters.

The strategic objective of this contract was to increase the marketable value of agricultural output by $250 million by June 2006. Intermediate results expected to contribute to the accomplishment of this objective were:

- $100 million in fresh and dried fruit;
- $20 million in fresh and dried vegetables;
- $50 million in nuts;
- $50 million in livestock and poultry; and
- $30 million in wheat and food grains.

Afghanistan produces a broad array of agricultural products. However, economic growth is product specific and resource allocation had to be rationalized in such a way that only those products that have the greatest potential for expansion, marketing, incomes and employment generation had to be promoted. The contribution of agricultural products to incomes and economic development depends to a considerable extent on their competitiveness and comparative advantage in domestic production and export marketing. A combination of

methods and criteria were employed to identify the priority commodities to be promoted under RAMP. A historical comparative analysis was conducted for product groups to estimate their contribution to the national economy. Further analysis was then conducted to evaluate the economic profitability of products to decide whether the crop, fruit, livestock and other agricultural products being undertaken in the country represent an efficient use of the country's scarce land, labor, capital and foreign exchange. Based on this assessment five principal, higher return product lines: fresh and dried fruit (grapes and raisins, fresh and dried apricots, and pomegranates); fresh and dried vegetables (potatoes, onions, melons, tomatoes, okra and eggplant); nuts (almonds, walnuts, and wild pistachio); livestock and poultry; and wheat and food grains were identified and prioritized for support.

The selection of high-value products was designed to increase private sector participation and marketing activity and agribusiness capabilities in order to provide additional incomes and employment opportunities for many people through both backward and forward linkages. The livestock and poultry sub-sector activities were designed to improve food security while also creating opportunities to engage women and thereby increase household incomes. The horticulture priorities, including fresh and dried vegetables also offered opportunities to bring women into active participation in production and marketing. RAMP promoted the production and marketing of perennials and high-value seasonal vegetables to offer feasible alternatives to the illicit production of opium poppy. Wheat being the staple grain of Afghanistan, a rapid increase in yields will not only improve food security but also lead to a decline in land planted with it and a corresponding increase in land planted with high-value commercial crops of nuts, fruits and vegetables.

II. IMPLEMENTATION STRATEGY

The wide range of problems facing Afghanistan demanded a strategic sector prioritization. For this reason, and because agriculture in Afghanistan is severely constrained by a multitude of problems - including poor rural infrastructure and undeveloped marketing structures - increasing the level of value added had to come from an integrated sector activities.

RAMP infrastructure and rural finance sector activities, to the extent possible and needed, were considered in their relation to supporting agriculture sector initiatives. Roads, irrigation, market centers were needed for marketing activities. Support to developing the institutional capacity for finance was also necessary to promote SMEs and micro-credit lending for agribusiness and for processing a proportion of primary commodities before sold. The sectoral approach was also crucial in promoting the private-sector to develop its competitive strength through support mechanisms involving credit facilities from financing institutions.

Production and marketing activities were supported through an integrated sectoral approach, involving rehabilitation of critical infrastructure – farm-to-market roads, irrigation systems, and marketing centers; increased flow of capital for small and medium enterprises and for income generating activities; dissemination of improved agriculture technology and extension services to help farmers become more efficient, and identifying market niches - both domestic and international - and undertaking market analysis to support the development of a private sector. Market structures and infrastructure, like cold storage, were promoted to ensure product quality and competitiveness in a growing global market. The livestock sub-sector was a national program in which veterinary services were provided to farmers and herders to rebuild their animals depleted from the recent drought and increase their productivity. The distribution of pullets to rural women, augmented with the provision of

vaccination services and market development aimed at reviving the poultry sub-sector economy.

As a complement to the sectoral approach, RAMP also adopted a regional approach in which activities were clustered in certain locations in the country to support strategic products. Interventions focused, though not exclusively, on priority provinces of Kunduz, Parwan, Baghlan, Balkh, Ghazni, Helmand, Kandahar, Herat and Nangarhar. These are by far the most populous and agriculturally productive provinces in the country. Accounting for 41% of the rural population and 53% of the total irrigated area in the country, these provinces produced 55% of the total wheat output in Afghanistan in 2004. They also produced the bulk of other cereals and over 60% of the fruit and vegetables. The integration of regional markets through a network of highways for a relatively smooth flow of inputs and output as well as the predominance of high-value crops in the cropping system of these provinces offered increased opportunity to raise agriculture production for food security and incomes and thereby tackle the dependence on illicit crop production, particularly in Helmand and Nangarhar provinces. Some RAMP interventions, like the livestock health, rural finance, and agri-input dealer training have national coverage.

Projects were implemented indirectly by subcontracting to competent national and international organizations. Project implementation required close collaboration with other USAID contractors, key ministries of the Government of Afghanistan, in particular with the Ministry of Agriculture and Irrigation (MAI). Working closely with the extension, veterinary and crop departments of the MAI, both in Kabul and in the provinces, RAMP made substantial contribution to building the Ministry's human resource capability. The MAI's policy reform and sector planning capability was also enhanced through the development of a Master Plan for the sector. The project has worked closely with other USAID and donor-funded activities to increase synergy for a maximum impact. By providing a $5 million grant to the Microfinance Investment Facility for Afghanistan (MISFA), operated by the Ministry of Rehabilitation and Rural Development, and by co-investing, along with other investors, in the Afghanistan Renewal Fund, RAMP supported small- and medium-sized agribusiness sector initiatives in Afghanistan. RAMP also worked closely with processors, exporters and local traders as well as Afghan producer organizations to catalyze export-led growth.

An ex-post evaluation was conducted this year to measure the impact of the interventions undertaken by RAMP in reference to its strategic objectives[1]. The results show that RAMP has surpassed its contractual target of $250 million seven fold, with a return on investment ratio of 11:1. Impacts were measured independently for 9 sub-sector activities: irrigation, roads, rural finance, livestock, locust and Sunn pest, fruit and vegetable production/marketing, nuts production/marketing, refrigerated storage facilities (cold rooms), demonstration fields, and an emergency wheat distribution project in Nangarhar province. The individual sub-sector assessments provide in depth analysis of the interventions and their economic impacts. This particular document pulls together the sub-sector activities and provides a summary of the approaches, implementation strategies and the benefits aggregated by commodity group and technical sector. The individual sub-sector assessments are available at USAID's Development Experience Clearinghouse at http://dec.usaid.gov/.

[1] While RAMP activities continued through July 2, 2006, the economic impact assessment only reflects data collected through May 2006.

III. Sub-sector activities and impacts

1. Infrastructure

1.1 Irrigation

Problem Statement

The irrigation infrastructure in Afghanistan remains dysfunctional and operating at sub-optimal level, despite enormous rehabilitation works done over the past 10 years. Approximately 60-70% of the *karezes* (underground irrigation channels) are not in use and 85% of the shallow wells have dried up. The situation is exacerbated by the recent drought that has reduced the water level. Canals are silted, breached, and not functioning optimally. As a consequence, the irrigation potential of the country has been reduced significantly with detrimental effect on agriculture production. The irrigated area cropped has declined and crop yields are well below regional averages. Agriculture transformation is hampered as farmers allocate their land and other resources to growing subsistence crops. RAMP has rehabilitated/constructed 33 irrigation systems and structures in the period 2004 to 2006 in eight provinces: Kunduz, Baghlan, Balkh, Parwan, Nangarhar, Herat, Helmand and Kandahar. The rehabilitation work aimed at restoring irrigation structures to their original design level and in some cases to upgrade and expand the existing structures, and improve water use efficiency. The dams that have deteriorated were rehabilitated to capture and store water for agriculture and domestic use. The drainage projects aimed at rehabilitating waterlogged/salinized fields and reclaim waterlogged fields for agriculture activities. The flood control projects sought to avert the risk of land downstream being washed away by floods. The canal rehabilitation works included cleaning, construction of new river intake systems, rehabilitation defunct “support” structures like culverts, bridges to ensure adequate and stable supply of irrigation water.

Development Hypothesis

With 90% of the agriculture output produced from irrigated land, an optimally functioning irrigation infrastructure is critical for the development of the country’s economy. Irrigation, drainage, and flood control investments can drastically increase productivity. Irrigation will stabilize harvest fluctuations, allow the introduction of second crops and increase land productivity further making it possible for increased application of fertilizer, the use of better seeds, and improved crop husbandry practices to boost domestic food production. With improved irrigation and on-farm water management, farmers will be able to increase yields and achieve national targets for crop production: 6 metric tons (mt) / hectare (ha) for wheat, 30mt/ha for tomatoes, 25mt/ha for potatoes and about 30mt/ha for onions.

Methodology

Using data collected from the field, the cropping pattern and the area irrigated was estimated for each project command area. A command area is defined as the area that can be irrigated from a scheme after rehabilitation and is fit for cultivation under farmer technology. The reported command area is thus adjusted downward by a 10% to 15% to account for a possible inclusion of non-cultivable land. In order not to overestimate benefits, ‘low-median’ crop yields are calculated and these are retained for the entire period under consideration.

The technical life of the projects is estimated to be in excess of 15 years. However, benefits are claimed for six years. In the first three years, the additional land brought about because of irrigation will be cultivated incrementally. In the next three years (years 4 to 6), area shift will take place from low-value to high-value crops.

Impact is measured as the difference between with and without rehabilitation i.e. the net incremental gain produced by the rehabilitation of irrigation systems. The net gain is then valued using constant prices so as to directly compare benefits in real terms.

Benefits come from area expansion, increased productivity and cropping intensities. This kind of 'horizontal intensification' has special significance under smallholder production system and can increase output with higher cropping intensities. A more dynamic method involves area shift in which farmers shift some land allocated to growing low value crops to growing high value crops of fruit and vegetables. This is a method of 'vertical intensification' as it links producers with processors and exporters. The extent of the shift in area reflects the stage of development in the country, increasing in magnitude as the country industrializes. Based on current farmer technology and production strategy – which often emphasizes food security from own production - a 3% to 5% shift area shift is assumed to happen every three years with rehabilitation of irrigation systems.

For those projects completed before the cropping season of 2005, benefits start to flow from year one. Conversely, for projects completed after the cropping season of 2005 and for those completed in 2006 benefits start flowing from year two. That is to say, the first year 'benefit' is simply a 'base year' and the actual stream of benefit begins to flow from year two onward.

In order to assess financial viability of the projects, the internal rate of return and the net present values were computed for each project. Benefit-cost ratios were also computed for each project.

Critical Assumptions

Currently, water is not adequate to irrigate all the land; only 40% - 50% of the land is irrigated optimally; the remaining 50% - 60% is irrigated inadequately. With rehabilitation, all the land will be irrigated optimally and crop yield from currently sub-optimally and poorly irrigated land will increase to the level attained under optimally irrigated condition.

It is also premised that with rehabilitation, new land will be brought into cultivation. This new land will be cultivated incrementally in the first three years. In high-population density provinces where the average cropped land per household is relatively small – like Parwan and Nangarhar – all the additional land may be brought into cultivation in a short span of time as long as irrigation water is adequate and farmers have necessary labor and inputs. Conversely, in Helmand and Kunduz, acreages are above average and the additional lands will be brought into cultivation at a slower pace, but not exceeding three years.

With irrigation, there will be area shift every three years from low value crops (proxied by maize, rice, and barley) to higher-value, market-oriented products (proxied by tomatoes, onions, potatoes, and melon). Where water is a binding constraint even after rehabilitation, like in Helmand, Herat and Balkh, a 3% area shift is presumed to occur every three years, starting in year four. For Parwan, Nangarhar and Kunduz, a 5% area shift is predicted as these provinces have relatively better irrigation capability.

The switch of crops in irrigated areas may in turn create or expand demand for crops of non-irrigated areas, leading to increased aggregate farm output. With irrigation, cropping intensity will increase and double cropping may be feasible in warmer climates in the southern and eastern parts of the country.

Results

Construction of drainage systems, coupled with some land smoothing works and irrigation systems improvement, and leaching and drain maintenance works has restored the productive potential of about 140,000 hectares of farmland.

Through RAMP's rehabilitation activities 59,000 hectares of land was protected from flooding.

The rehabilitation of canals and the construction of diversion dams have also enabled farmers to optimally irrigate 280,000 hectares of land and increase their output.

About 9% of the increase in area irrigated is additional land which was made possible through the rehabilitation of irrigation systems. In absolute terms, the net gain was about 45,000 hectares.

With rehabilitation, cropping intensities have increased significantly for all schemes. Among the irrigation systems, the highest cropping intensity was obtained for Barq and Afghan canals in Parwan. It increased from 124% without irrigation to 185% with irrigation for Barq canal, and from 118% to 172% for Afghan canal. Almost all the irrigation systems in Baghlan and Balkh have also achieved high cropping intensities.

It is calculated that through area shift, there will be a net gain of about 2,000 hectares and a net benefit of $2.4 million over a three year period.

Food security estimates indicate that 8 irrigation systems, 6 of which are located in Parwan, produce surplus food (cereals) somewhat less than the per capita requirement of 160kg/person per year. This is because agriculture in Parwan is driven more by the market than any where else in the country; most farmers allocate more land to grow commercial rather than subsistence crops.

The rehabilitated irrigation systems supporting cereal surplus production are located in Kunduz, Baghlan, Helmand and Balkh. Farmland in the command of the Chardara canal in Kunduz produced 1,638kg/capita cereal. Farmland in the commands of the Ab Qul canal in Baghlan, Bogra canal in Helmand, Chimtal Canal in Balkh, and Khanabad dam in Kunduz have each produced in excess of 1,000kg/capita cereal.

Needless to say, all the 33 irrigation systems have increased agriculture production with rehabilitation and hence per capita food availability. With an average per capita cereal availability of 278kg, food security is assured for the population accessing the irrigation systems.

The rehabilitation works have created jobs for both men and women. The total employment of the rehabilitation works was 1.9 million labor days.

The total net benefit from rehabilitation of 33 irrigation projects is $1.2 billion over six years, benefiting an estimated 2.6 million people. This gives a return on investment ratio of 60:1, which can be accredited to RAMP and its implementing partners. A simple decomposition exercise indicates that $464 million, about 39% of the total benefit, was obtained from area expansion, including area protected from floods. The remaining 61% was due to increased productivity from irrigated and drained land.

The assessment indicates that investment on smallholder irrigation pays off well, and the irrigation systems will generate a sustained stream of benefit for at least 15 years. They will also have important 'drought proofing' consequences. Stability in crop output is as equally important as increasing it. However, management of operation and maintenance of irrigation systems affects the cropping pattern and the general viability of irrigation systems. Communities will have to pool their resources together and resolve problems related to operation and maintenance, including free-rider problems. Water management and water pricing will ensure not only equitable access to water but an efficient use of water. RAMP has made some progress in this regard through the formation of a water user association in Herat. Preliminary work was also completed in Helmand to establish a similar association. The initiative strived to formalize and legitimize the high *de facto* farmer participation in irrigation management that existed for many years. It is important to build on this effort for a sustained development. A combination of supply augmentation (through rehabilitation and construction of irrigation systems) and demand management will be required to optimize water use and increase agriculture production. With a proper management and operation of irrigation systems, water distribution will be more equitable and agriculture production in Afghanistan will be able to increase quite substantially.

1.2 Roads

Problem Statement

Afghanistan is underserved with roads. The estimated road density of 0.027 km of road per square kilometer of land places Afghanistan at the bottom end of developing countries. Although a scattered population and the presence of large uncultivable expanses bias the road density downward, the ratio of roads to cultivated land of 0.35 km of road per square kilometer of land is also very low. Barely 20% of the rural population has access to motorized transport. Year-round and relatively easy access to motorized transport is confined to villages located in close proximity to markets and cities. Many villages are extremely isolated either because the roads are of poor quality and hence seasonal and/or there are no roads at all for motorized transport. This has several effects. Only an estimated one-third to one-half of the agricultural output enters the market due to poor or inaccessible roads. Markets are also poorly integrated. As recently as 2004, the regional difference in the price of wheat between Mazar-i-Sharif in the North and Kandahar in the South was as high as 67%.

Since July 2003, RAMP rehabilitated 49 non-congruent farm-to-market road segments in seven provinces: 1 segment in Wardak; 2 in Ghazni; 3 each in Baghlan and Parwan; 7 in Kunduz; 9 in Balkh; and 24 in Nangarhar. These road segments have a total length of 522km. The rehabilitation work involved surfacing, track/earth gravel, compacting and upgrading to all season road, and all minor and major cross drainage works, washes, culverts and on existing gravel. These roads were considered critical for agriculture growth, because they link villages with district market centers. Some of the roads also connect villages with primary roads and highways and through them with 'major' markets in the country and in the region.

Development Hypothesis

Development efforts in Afghanistan could be hastened if rural roads are developed/rehabilitated in locations that are pivotal in terms of multiplier effects favoring agriculturally more productive locations. Access to motorized farm-to-market roads permits diversification of activities, induces higher productivity and improves incomes. It provides incentives to farmers to use more fertilizer, as transportation costs for agri-inputs is also reduced, and more land can also be planted with improved varieties and high-valued crops; markets for commodities will also develop, further driving up agricultural productivity.

Rural roads can also generate other direct benefits to farmers, such as savings in freight cost and fares. Roads can also be social and economic arteries for communities with a myriad of localized impacts, including the ability to make periodic social visits and access schools and other public services. Beyond this, rural roads in Afghanistan may contribute to political stability, ethnic reconciliation and state building.

Methodology

In order to isolate the benefits of roads from other activities, changes in villages serviced by the roads are compared with control villages (villages that do not use the roads) to arrive at the net impact due to road improvement. This allowed the comparison of 'with' and 'without' project situations. The sample population from the treated villages was selected from the zone of influence, which is defined as the 'impact zone' with a 2km radius on either side of the road. Given the rugged topography and settlement pattern in the countryside, a 2km buffer was deemed a realistic zone of influence beyond which the impact of the roads is expected to diminish.

The control villages were selected randomly from a list of villages outside the 2km buffer but located in close proximity (not exceeding 4km from the 2km buffer). This randomness assured that the treated and control villages are statistically equivalent and comparable to one another; they differ only in the receipt of roads.

Data were collected by means of surveys administered to farmers and by monitoring the flow of traffic on market and non-market days. The stream of benefits measured are a) reduction in spoilage loss; b) producer transport cost savings (freight cost); c) producer fare saving; d) producer travel time savings (opportunity cost); e) net gain in agriculture production (value added); and (f) transport operators' cost savings. Other impacts, like the difference in cropping pattern and the marketed surplus are also analyzed to shed light on the marketing behavior of farmers and also to measure transport costs.

The first four categories of benefits (a to d) constitute cost components to farmers which, in the absence of rehabilitation, are benefits foregone in terms of increased agriculture production. With rehabilitation, the savings made by producers can be used for agriculture purposes. Thus, by taking the proportionate share of each crop in the output value (from item e), crop-specific benefits are imputed for the first four items which are then aggregated into their impact on RAMP's priority commodity groups. Specialization between agriculture producers and transport operators is not a clear cut phenomenon in rural communities. For example, a farmer could at the same time also operate a taxi service. But assuming in order to measure benefits accrued to 'full-time' farmers, the benefit gained from reduction in transport

cost operation is attributed to transport operators (item e). This benefit is derived by deducting some of the benefit passed on to producers by way of reduced fares, rates and time saving from the total gain made from reduced vehicle operation cost with rehabilitation of the roads.

Critical Assumptions

Rehabilitated roads induce agriculture change through supply side effects. With rehabilitation, the volume of output, productivity of the land, and monetary values of output will increase. Rehabilitated roads will also induce farmers to grow more commercial crops and increase their marketable surplus.

Rehabilitated roads will attract more transport and more competition, leading to lower fares and rates.

With road rehabilitation, vehicle operation costs fall due to increased economic activity in the influence zone (induced), some of which is passed on to farmers by way of reduced fares and rates. It is also assumed that the significance of non-motorized transport will decline over time.

Results

The rehabilitation of over 500km earth roads to an all-weather feeder road of maintainable standard has established effective communication between agriculturally productive areas and markets. In some cases the roads have improved access to people that are otherwise isolated.

The roads have increased the frequency of services and the modal mix of transport; they have increased the number of trips farmers make to markets; reduced transport costs to road users, reduced operators costs, increased agriculture production and marketing activities.

The total imputed benefit from the roads is $28.6 million. This benefit is produced in the first three years, with one year lag after rehabilitation. Benefits to farmers by way of reduced fares account just under 3% of the total impact. The comparable figures for freight and time savings are, respectively, 3.5% and 20%. The benefit in terms of value added agriculture production is 33% while saving from reduction in spoilage loss is estimated at just over 7%. Savings in vehicle operation cost accounts for 33% of the total impact value.

The roads may last for a number of years, provided that they are periodically maintained. It is estimated that by year four some maintenance would be required to maintain the roads at the current level of operation. Irrespective of this, the benefits over the seven year period can rightly be attributed to RAMP. However, in order to guard against over estimation of benefits, a more conservative approach has been adopted in which benefits are claimed for the first three years only.

2. Agriculture Technology and Market Development

2.1 Locust and Sunn pest

Problem Statement

Food production in Afghanistan is sensitive to rainfall variations and in the course of the 21st century four years have been rated as 'dry'. Uncontrolled locust and Sunn pest populations greatly reduce crop yields or, in some cases, completely destroy the harvest further weakening farmers' precarious food security situation. Locust has been endemic particularly in the Northern and Western provinces. Sunn pest is widely distributed throughout the country but tends to be a major menace in the South around Helmand and in some Western provinces. Sunn pests feed on the ears of wheat during milky stage and causing significant crop losses. Flour made from damaged grain has reduced baking quality and bread made from it is almost inedible. The straw of infested wheat is also valueless as livestock forage.

Since 2000, there have been a number of outbreaks of locust and Sunn pest diseases, accentuated by the drought (1999 – 2002) and the absence of pest control operations. Since 2000, three of RAMP's implementing partners –FAO, GOAL and CADG – undertook locust and Sunn pest control initiatives. Locust control activities in Northern Afghanistan consisted of ground spraying of Moroccan Locust hopper bands with Ultra Low Volume (ULV) pesticides. Other key activities included, monitoring of locust-infested sites and program advances through constant feedback, crop damage assessments, and locust egg-bed. The project was implemented in cooperation with Ministry of Agriculture's Plant Protection and Quarantine Department (PPQD).

The Sunn pest control program implemented by FAO and PPQD in 2005 and 2006 also involved chemical spraying using hand-held, battery-driven ultra light volume sprays to complement sweep nets used to physically remove insects from the crop.

Development Hypothesis

Systematic control of locust and Sunn pest reduces losses of agriculture production and enhances the capacity of Afghan people to cope with recurrent pest outbreaks. When control measures are applied sequentially over the agricultural seasons, the incidence and intensity of outbreaks is reduced, likewise, the cost of control measures is also reduced. Higher food security and income for Afghan farmers creates conditions conducive for the development of agricultural markets not only for staple crops but also for high-value crops.

Methodology

The area and yields affected by locust and Sunn pest were assessed and compared with yields of unaffected areas to determine the tonnage of wheat saved. For the first two years, this was done using GIS to overlay a land cover map, the locust and Sunn pest infestation maps and the provincial yields provided by MAAHF.

The effect of pest control practices in 2004 and 2005 is assumed to have a negative effect in the incidence of locust and Sunn pest in 2006. Thus conservative estimates of wheat yields and extent of infestation were used for both locust and Sunn pest.

The incidence of locust in 2006 was assumed to be 15% less than the previous year. Yields were adjusted for the proportion of rain fed and irrigated wheat in each province and with the Normalized Difference Vegetation Index (NDVI) image of April 2006 with respect to the image of April 2005. This index measures the greenness of vegetation compared to that of last year for which wheat yields are known.

Based on national estimates, the share of commodity groups (fruit, vegetables, nuts and grains) was estimated by RAMP using 2004 prices. Ratios derived from this estimate were used to disaggregate the impact value of the locust control project. Given the lack of area specific output data for commodities, this estimation technique was deemed suitable to determine the share of commodity groups.

Critical Assumptions

The extent of risk posed by locust this year is based on assessments of the situation in the previous year. It is assumed that all crops within a square in which control occurred were at risk, and the total crop area at risk was equal to the sum of the crops in the squares in which control took place.

The estimation of wheat saved in 2006 campaign was done by considering the NDVI for the month of April. The image shows less vegetation in 2006 compared with 2005 in the Northwestern provinces of Jawzjan, Faryab, Herat and Balkh. The exception is the province of Sar-i-Pol with more vegetation than last year in the same month.

It is assumed that rainfall deficits in 2006, approximated by the NDVI, will decrease wheat yields by 40% in Juzjan, 0% in Sar-i-Pol, 25% in Faryab, and 5% in both Herat and Balkh.

For Sunn pest, impact was valued using a factor for yield and price reduction due to lower quality grain in infected crops. Thus, cereal yield is assumed to fall by 30% and price by 45% due to inferior grain quality.

Results

Wheat was used as a proxy to value the impact of the interventions. It occupies at least 50% of the land and its agricultural cycle coincides with the biological cycle of the pests. The combined control measures for both locust and Sunn pest carried out between 2004 and 2006 accrued to 750,000 metric tons of wheat saved with a value of $171 million. This gives a 66-fold return on project investment. The average tonnage saved per year is 250,000 metric tons. This is equal to the average annual food aid to Afghanistan since 2,000, thus representing a meaningful contribution to Afghan food security.

The project has had several benefits beyond the immediate objective of preventing crop damage by locust and Sunn pest: (i) it has given confidence to farmers that the government and aid community can intervene effectively to avert crop loss; (ii) it has re-engaged provincial MIA (Plant Protection and Quarantine Department) staff in field operations; and (iii) it has built up knowledge of locust and Sunn pest control skill in the farming communities. It is also worth mentioning that some implementing agencies are able to raise additional funds to carry out control measures. For example, Sunn pest control in Helmand province is currently carried out by CADG with financial support from other sources. The Agrometeorological Monthly Bulletin has set the stage as a real time service provider for GIS applications and impact assessments. Its long-term mission will improve the knowledge base to cope with scarce and variable rainfall.

Summing up, transferring skill and building capacity will sustain the pest control campaign to generate benefits for many years to come. Higher and less variable agriculture production will improve food security and ultimately favor the condition for farmers to adopt production of higher valued crops.

2.2 Demonstration Fields

Problem Statement

Technology dissemination through extension and on-farm demonstration holds great promise for Afghanistan, where years of war and drought have crippled the country's agricultural capabilities. RAMP partners established 3,842 demonstration plots in 8 provinces: Kunduz, Kabul, Kapisa, Parwan, Nangarhar, Ghazni, Helmand and Kandahar. The program included an intensive effort to identify, demonstrate and disseminate new and improved production technologies. Main extension approaches used include, farm visits, field demonstration days, and mass contact through publications, radio and television programs.

Development Hypothesis

Agricultural innovations and marketing practices are effectively transferred through demonstrations that reflect farmers' conditions; faster rates of adoption are expected to make meaningful contributions to increasing agricultural output.

Methodology

To assess the value of output by farmers who participated in the on-farm demonstrations, 2,669 households in 150 settlements spread over 8 provinces were interviewed at the end of 2005. Farmers within a radius of 12km from demonstration plots were asked about the use of recommended practices on a continuous basis since 2003. The questions were asked by type of crop (cereals, fiber crops, fruits and vegetables, among others), with regard to production practices such as the use of fertilizer, improved seed, weeding and control of pests, and harvesting and with regard to marketing practices (sorting, cleaning, processing and packing). Farmers using three or more practices were considered to be adopters of recommended practices for a particular crop.

To impute a dollar value to the overall impact of adoption (all crops) in the provinces where RAMP worked, an estimate of agricultural production of the surveyed region was required. Since specific agricultural statistics for the regions were either non-existent or difficult to establish, FAO 2003 – 2005 estimates on cereal production for the region were used as a proxy. The regional contribution to agricultural GDP was further partitioned into contributions made by adopters and non-adopters. To quantify the contribution of on-farm demonstrations on the impact made by adopters, the overall adoption rate for 2003, 2004 and 2005 was regressed on participation in activities initiated by RAMP through demonstrations. The r^2 value of each bivariate regression was used to weight the difference between the value of production of the adopters to the regional agricultural GDP and the value of production of the non-adopters to the regional agricultural GDP.

Critical Assumptions

Lacking updated data for earlier years, adoption was measured in retrospect in which farmers were asked about the techniques and practices they used.

Of an array of best practices demonstrated, farmers who adopted three or more practices were considered as 'adopters'.

To attribute impact, external factors that may have also contributed to farmers' technology adoption were held constant. It was also assumed that the project does not overlap with efforts of other development agencies.

Results

The direct share of the on-farm demonstrations in the agricultural GDP of the provinces during 2003 to 2005 is about $89.8 million. Overall rates of adoption (all practices for all crops) increased from 45 percent in 2003 to 58 percent in 2005 but there were major geographical differences in the overall adoption rates.

The adoption rates in the North were noticeably higher since 2003. Helmand and Kandahar in the South had low adoption rates in 2003 but rapidly increased in 2004. The low overall adoption rate was measured in Ghazni, possibly because of communication problem rather than farmers' resistance to improved technology.

The rate of adoption by crop was highest for cereals 22%, followed by vegetables with 16% and fruits with 12%. Farmers showed more enthusiasm about annual crops (vegetables) than perennial crops (fruit trees) because of the long gestation period associated with perennials.

Furthermore, among the recommended practices for fruits, plant protection practices, pesticides, earthing-up, fertilizer use and pruning were the top priorities, in that order; in contrast, harvesting, grading, packing and storage were the lowest priority, in that order.

2.3 Nangarhar Emergency Seed and Input Distribution

Problem Statement

The drought that persisted over the past 5 years has reduced the water table with detrimental effects on food security and economic development in Nangarhar. Most farmers are food deficit for at least 2 months in a year. Out of the total rural population of 1,243,000, 45% consumed less than 2,100 calories per day in 2005. At the same time, there was a concerted effort by the Afghan government and donor agencies to eradicate poppy cultivation and processing from the province. The seed and input distribution campaign was launched to reward those farmers who have abandoned poppy cultivation in the previous year while inducing those still growing poppy to disengage from growing the crop. Under the project, RAMP was entrusted by the USAID/Afghanistan with the procurement of improved seeds and fertilizers and for transporting them to distribution centers in the province. To more effectively and efficiently organize and manage the implementation process, RAMP sub-contracted a number of implementing partners while identification of beneficiaries was left to local *shura* - traditional community council. The project ultimately distributed improved wheat seed to 19,574 farmers throughout the province.

Development Hypothesis

Wheat productivity will increase and improve farmers' food security and self sufficiency. This will in turn encourage farmers to plant more licit crops in lieu of opium poppy.

Methodology
A numerically manageable spatial domain, covering only nine (9) districts with a total sample size of 157 smallholder farmers, was chosen using a simple random technique to assess impact. Depending on the size of the district, a minimum of 6 and a maximum of 36 farmers were interviewed from each district. This was done to generate a proportionate numerical representation of the districts.

Critical Assumptions
Improved inputs, adapted to the agro-climatic condition of the province, were distributed in adequate quantity in time for the seasonal crop in order to make farmers' efforts worthwhile, improve food security and discourage poppy cultivation.

Results
The project has enabled a large number of food deficit households to produce more wheat, possibly circumventing the need for food aid. Total wheat output was 9,886 metric tons, produced by about 18,000 farm families. This figure is equal to 16% of the total wheat produced in Nangarhar province in 2004. It meets the annual per capita wheat requirement of 61,786 persons – that is, about 11% of the provincial population consuming less than 2,100 calories per day. The total impact of the project was $2 million.

It is not however readily obvious if the project has induced poppy growing farmers to grow wheat rather than poppy. The dependence on poppy is such that smallholder farmers require continuous assistance to ensure food self sufficiency if they were to disengage from illicit crop production.

2.4 Livestock and Poultry

Problem Statement
Livestock and poultry are integral to agriculture production in Afghanistan, providing livelihoods to 80% of the population. However, the livestock population was decimated from the drought, disease, crisis sales and low reproduction rates over the past five years. High mortality and low fertility rates depress animal productivity.

As with the livestock sector, the poultry sector is critical for incomes, but most rearing is free range and productivity is low. The traditional poultry system is making a steady recovery throughout Afghanistan. Demand for poultry products exceeds domestic supply and large quantity of poultry meat and eggs is imported from as far as Brazil. At the same time, the indigenous breeds have very low production potential with annual mortality of chickens often reaching 65% of the flock population..

RAMP launched a veterinary campaign in 2004 to provide vaccinations against major infectious diseases in large and small ruminants, equines, camels and in poultry in 33 provinces. In addition, curative treatments were administered against common parasites and certain diseases affecting livestock, including equines.

In the poultry sector, RAMP augmented interventions by the UN and NGOs that propagate poultry production and use poultry birds as instruments for income generation. Modelled on the concept of 'village poultry production' first developed by FAO in 1999 in northern Afghanistan, the RAMP poultry program worked with village women to increase poultry

production through the distribution of pullets and vaccinations in seven target provinces – Parwan, Kunduz, Nangarhar, Ghazni, Baghlan, Herat and Bamiyan. Poultry producer groups were established by groups of village women to maintain the supply of inputs, to arrange vaccinations and collectively market chickens and eggs.

Methodology

To derive at the actual number of animals covered by the vaccination campaign, the reported vaccination coverage figure was divided by three - the average number of vaccines normally administered to cattle and smallstock.

To quantify losses and hence the benefits of the veterinary program, the number of animals saved 'with' and 'without' veterinary program is calculated. The difference between the two scenarios is regarded as a net gain for RAMP.

The head value of animals is based on farm gate price averaged for the country. Prices are held constant over the entire period. Average prices reflect prices paid for animals intended for meat, transport and draught as well as the generally higher prices paid for female animals for reproductive purposes in the post-drought period.

Annual offtake rates for cattle and smallstock are calculated from the net incremental gain of animals saved. Productivity gains from oxen saved through vaccination is derived by applying a daily rental rate. Productivity gains from equines and camels are measured for their transport and work.

Benefits are derived incrementally on an annual basis. For cattle covered in the first year veterinary campaign (2004), both fertility and morbidity gains are derived and valued. Animals alive by the close of the first year (less post-vaccination death and offtake) are carried forward to the next year (2005) and again to the third year. In this case fertility related benefits are claimed for two out of three years because of longer calving intervals for cattle.

For new cattle brought into the veterinary campaign in 2005 and 2006, benefits from improved fertility are claimed for one year while the net head gains from reduced mortality are valued annually.

For smallstock, both fertility and morbidity related gains are valued on an annual basis as their calving interval is much shorter than for cattle.

Productivity gains from equines and camels are also valued on an annual basis. These gains are derived from the demand for their work on farms and for transport rather than from improved fertility, mainly because the reproductive parameter of these animals is not known. The 'active' work days is estimated as 60 days per year for donkeys and 45 days per year for horses and camels.

Benefits from the poultry project are valued in the same way as with smallstock. The eggs produced and the chicks hatched annually are valued to derive net productivity gains. The hens surviving in the first year are carried forward to the second and again to the third year.

Development Hypothesis

Livestock offer opportunities to increase incomes and employment, given appropriate support. Generally, the income elasticity for livestock products are higher than for cereals. With rapid population growth of about 2.5% per annum and increased urbanization and incomes, demand for livestock products in Afghanistan is growing at a faster rate.

The case for promoting increased livestock production is also pressing given a large proportion of the population living in extreme poverty, most of who are dependent, at least in part, on food and income derived from livestock. Benefits from livestock development will in particular accrue to the poor and rural women, primarily because they tend to be more associated with livestock production than with crop production.

Critical Assumptions

Mortality and fertility coefficients as well as the herd structures, extrapolated from comparable agro-pastoral economies in Africa, are applicable to Afghan herds and flocks.

With vaccination, mortality rates will fall while fertility rates improve. Animal productivity and annual offtake rates will increase in relation to fertility trends.

Mortality rate in poultry will fall from 65% under traditional system to 5% with vaccination against Newcastle Disease and improved feed and management of birds.

Average productivity of a hen is assumed to be 150 eggs/year but falling by 10% annually. About 25% of the eggs will be hatched for multiplication of which 95% will survive.

Given that some NGOs also provide veterinary services in some parts of the country, 100% of the gain from poultry and 70% from livestock can be attributed to RAMP. This is presumed to be a realistic share to RAMP.

Results

The total number of cattle and smallstock (head count) targeted by the three year veterinary project was 2.3 million, and of equines and camels 244,000. These targets were met, with most animals vaccinated, treated and medicated at least twice.

In the poultry sub-sector, over 366,000 pullets were distributed against a target of 345,000 to about 22,230 women. 1.6 million vaccinations were provided against Newcastle and other known diseases in six provinces. Through the distribution of pullets, the project has achieved 77% coverage and established 932 village producer groups.

Interventions in the livestock and poultry sub-sector have resulted in a total impact of $256 million over a three year period. This gives a return on investment ratio of 16:1. About 80% of the gain is due to improved productivity, 60% of which is from cattle and smallstock. Reduction in mortality accounted for 20% of the total gain. In terms of species, impact from cattle and smallstock accounted for 60% of the total gain, equines and camels for 30% and poultry for about 10%.

The project has also built local capacities to overcome the constraints posed by shortage of qualified veterinarians in the country. It has established 388 field units and trained 498 paravets and 136 basic veterinary workers. Moreover, the project has established 8 cold

rooms in 8 provinces to store vaccines and another 9 cold rooms to store milk and other dairy products such as butter and cheese.

The poultry project has trained 28,000 women in poultry management and established 800 producer groups (PPGs) to maintain the supply of inputs and to arrange vaccinations. Marketing of eggs is also to be organized through the PPGs. The project has also supported the establishment of 5 poultry feed processing units in the country.

These initiatives will build capacities for an effective livestock and poultry program in Afghanistan. They will bring additional benefits to the country by substituting domestic products for imports.

2.5 Fruit and Vegetable Marketing

Problem Statement

Marketing is by far the most significant factor that constrains innovation and entrepreneurship in Afghanistan. More than a third of farmers sell their horticulture output at the farm gate. Some farmers are also engaged in contract farming with prices fixed before the harvest.

A demand driven approach to market development ensures that farmers produce what they can sell. Through its partners RAMP has contributed to the strengthening of agricultural value chains; it has provided technical assistance geared to enhancing production and marketing practices. It has constructed 142 structures in 13 provinces to serve as collection centers and also for sorting, processing, grading and packaging of fruit, nuts and vegetables.

Development Hypothesis

During the last 25 years, European demand for dried fruits and vegetables has subtly, though steadily, climbed while available local European supply has been replaced by imported products. Over the years, high labor costs in Europe have forced many producers of dried fruits and vegetables out of business. This has created opportunities for developing rural economies with the appropriate agro-climatic conditions, high production potential, and low operating costs to market their produce.

Moreover, annual demand of about 8,500 tons of dried fruits and vegetables remains unfilled mostly because the major producers in the developing world (Egypt, China and India) are too large to effectively re-tool their machinery for comparatively small, ‘odd cut’ orders, that is diced and sized vegetables (i.e., turnips, spinach, cabbage, courgette, and sun dried tomatoes) to non standard dimensions.

The rationalization of the world market for fruit, nuts and vegetables has created a window of opportunity for Afghan entrepreneurs to increase their export share. Reactivation of the fruit, nut and vegetable sub-sector marketing can significantly improve food security and contribute to earning foreign exchange. Nuts in particular are the most financially remunerative legal crops in Afghanistan. Through proper harvesting, grading, storing and processing for domestic and regional markets (India, Pakistan and Gulf), significant value-added benefits can be realized from fruits, nuts and vegetables.

Methodology

A survey carried out to assess the impact of on-farm demonstrations implemented by RAMP revealed that farmers who adopted the technology propagated have produced fresh vegetables and fruits worth $29.6 million and $17.9 million, respectively. Using national ratios for 2004 for home consumption and domestic wholesales, the benefit accrued from the on-farm demonstration scheme was disaggregated accordingly: 26 percent of the value of fresh fruits is consumed at home and 74 percent is sold in the domestic market. Similarly, 30% of the value of vegetables was consumed at home and 70% sold domestically.

In addition, export sales records by group (dry vegetables, fresh and dry fruits, and nuts) were analyzed based on quarterly reports from the various implementing partners. This includes 23 metric ton of dry vegetables exported by the RAMP-funded dehydration factory in Parwan; 112 metric ton of fresh fruits, 1,402 metric tons of dry fruits (raisin and apricot) and 16 metric tons of shelled almonds exported to Europe and Gulf countries.

Critical Assumptions

Actors in the value chain are able to link with each other by a web of partnerships to effectively market agricultural products.

The international market for fruit and vegetable is highly competitive. Afghan producers and traders are able to meet the demands posed by the rationalization of the market for products to be supplied at the right time and consistent in quality.

The structure of the domestic market for fruit and vegetable is competitive but the constraints posed by lack of capacity and facilities for on-farm processing and transformation of products for export purpose can be removed.

Results

The impact of RAMP interventions on increasing the marketable value of fresh vegetables and fruits domestically sold is estimated at $3.16 million, of which $1.04 million is for fresh vegetables and $2.12 million is for fresh fruits. The total value of exports of dry vegetables and fruits, fresh fruits and nuts during 2005 and the first 6 months of 2006 is $1.37 million, of which 77% is for dried fruit, 11% for fresh fruit, 6% for nuts and 6% for dried vegetables. Thus, the impact from domestic value-added and export sales of fruits and vegetables is $4.53 million.

There are other benefits, not quantified in this assessment: (a) technical capacity has raised quality standards in vegetable and dry fruit processing. RAMP has supported the vegetable dehydration factory in Parwan and the Laboratory of Quality control of Dried Fruits in Afghanistan’s Ministry of Commerce. Services provided by these institutions have set precedents and standards for those interested in export markets; (b) the entrepreneurial capacity building provided by RAMP has not fully matured yet but there are high expectations that exports will continue to grow because the international demand for high-value commodities (almonds, raisins, apricots and grapes) continues to grow and organized producers and wholesales have invested in value added facilities; and (c) stakeholders in the value chain have just begun to realize the value of market intelligence services that provide sustenance for developing business plans and to successfully apply for small and medium-size loans.

2.6 Refrigerated Storage (Cold Rooms)

Problem Statement

Fruits and vegetables account for 42% of the annual agricultural output value in Afghanistan. It is estimated that at least 20 to 30 percent of fresh vegetables and fruits lose their value due to lack of cold storage facilities. Further, about 40% of fresh fruit and vegetables reduce their value before sold to final consumers. The shelf-life of fruit and vegetables can be extended with cold storage and improved handling practices.

The potential for cold room development for fruits and vegetables exceeds 5,000 metric tons. RAMP has embraced the challenge to develop value chains for perishable products by linking demand with organized production. It has organized a group of farmers, traders and entrepreneurs to install cold rooms in strategic locations in the country on the basis of cost-sharing scheme. This assessment is based on the analysis of the 21 cold rooms that were installed by the end of May 2006. By the end of July 2006, 59 cold rooms, each with 25 metric tons capacity, will be installed in 10 provinces.

Development Hypothesis

Fruit and vegetable marketing is affected by the seasonality of production. At harvest, there is a glut in the market and prices are low. But as the season progresses, supply dwindles and prices start to climb, reaching a peak when supply is at its lowest. Cold rooms allow entrepreneurs to buy, store and sell fresh produce over an extended period of the season. Extending the shelf life of the produce and taking advantage of price seasonality adds value to agricultural production and is an example of market-driven value chain project promoted by RAMP.

Storing surplus products will reduce the dependence on imports, particularly of vegetables, from neighboring countries and benefit the country by saving scarce foreign exchange.

Methodology

Revenues are estimated as a function of the tonnage sold and sale price minus variable and fixed costs. A 10 year depreciation of the cold rooms is assumed and a 70 percent of its original value is the salvage value at the end of the third year.

The flow of benefits is estimated for three years, even though the cold rooms can last much longer than this. Under the current circumstances in Afghanistan, a three year period is considered a reasonable period to claim impact.

Critical Assumptions

The success of the project depends on knowledge of the crop calendar in the country as well as the structure of the market for fruits and vegetables. Currently, because of poor market integration in the country, commodities do not flow smoothly from surplus to deficit areas. There are also no seasonal commodity prices to guide producers and traders. The information available is for some provinces and even then it is incomplete. These constraints pose a challenge to the viability of the schemes. It will thus take time and organization before the cold rooms are fully developed into viable and integrated chain in the country.

Results

Refrigerated storage is a new initiative in Afghanistan. Producers and traders have yet to fully grasp its immense benefits. Cold rooms provide immense opportunity to develop value-added chains in fruit and vegetable. Currently the cold rooms are used for fruit only, most notably for grapes and pomegranates. In time other fresh fruits and vegetables can be included.

It is projected that the 21 cold rooms will store 2,000 metric tons of fruits annually in 2 cycles. Financial analysis was conducted for fresh grapes and pomegranates for three years. All but three of the cold rooms have a positive cash flow.

The projected net benefit from the 21 cold rooms is $1.37 million over a three year period. If the cold rooms were to operate at an average of 4 cycles per year, the potential capacity of the cold rooms would increase to 4,200 metric tons and the benefits will double the current level.

A number of indirect benefits flow from the cold room scheme. Afghan technicians are trained to assemble, operate and repair cold storage rooms and compressors, among others. Each enterprise operating the storage facilities has developed business plans. The infrastructure is being laid down for market intelligence imbedded in the market place beyond informal networking, and for producers to be vertically integrated with processors to process primary products and added value. As the value chains begin to be understood by farmers and traders, there will be a diffusion of entrepreneurial skills which will drive up local agribusiness capability in Afghanistan.

3. Rural Finance

3.1 Microfinance & Small and Medium Enterprise (SME) Lending

Problem Statement

Microfinance (MF) services have the potential to promote economic growth and development through improved resource allocation, promotion of markets and adoption of better technology; they can also provide an effective way to assist and empower women, who make up a significant proportion of the poor and suffer disproportionately from poverty.

The rural finance component of RAMP aimed at supporting the development of agricultural value chains in Afghanistan. Agricultural credit was financed through microfinance institutions, a commercial bank, a leasing company, and a venture capital fund. Emerging from the ruins of an economy in tatters, institutional microfinance in Afghanistan has evolved into an industry with prospects for financial viability, offering a broader range of services and significant opportunities for expansion. In time a large proportion of the millions of poor people will be able to access institutional credit

Development Hypothesis

Microfinance and agriculture development are inextricably linked because of the potentiality of microfinance to support agriculture. The demand for expanding agriculture production and agri-business development are facilitated by credit. Through microfinance, SMEs are encouraged to expand and diversify their enterprises. Microfinance services are used by low income groups, particularly women, to start income generating activities, and by farmers to procure inputs and expand farm activities.

Methodology

The development of financial institutions in Afghanistan is at its nascent stage, especially the Afghan Finance Company and Afghanistan Renewal Fund. There are thus no time series data on lending/borrowing to base and estimate impacts. In order to gauge the impact at the client level, the net present value (NPV) of income streams paid by borrowers to their financing institutions was estimated. Two different scenarios were examined over a three-year period of financing: a conservative scenario in which borrowers' value-added was equal to the interest they paid to the financial institution, and an 'optimistic' scenario in which value-added was 15% more than the interest they paid. The actual impact believed to lie somewhere between the conservative and optimistic scenarios.

The NPV scenarios for the Afghanistan Renewal Fund were based on its management's own projections for internal rate of return (IRR).

Critical Assumptions

The economy is unstable, and lenders must take additional precautions to prevent defaults and recover loans. This increases the cost of borrowing.

In some areas, religious leaders are against the basic principle of charging interest for the services provided.

Nevertheless, financial institutions will continue to function after RAMP, given the fact that pre-existing microfinance institutions in Afghanistan did not experience financial, legislative or institutional inhibitions.

Results

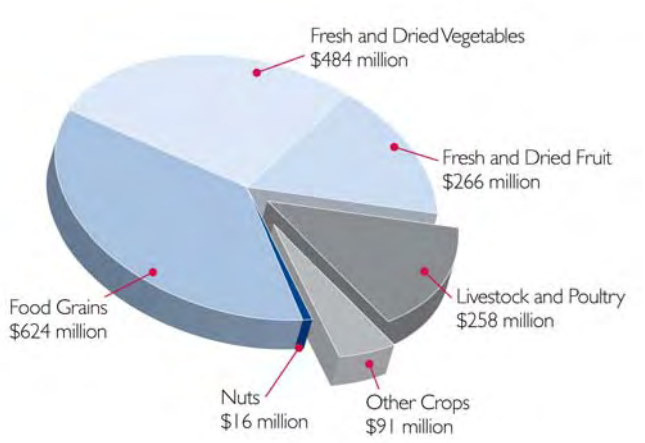
By the end of RAMP it is estimated that the total value-added from the rural finance credit institutions will be $1.9 million: $1.67 million due to the microfinance institutions, $139,461 due to the Afghan Finance Corporation, and $95,177 from Afghan International Bank. There were about 90,000 micro-loans and the majority was lent to women. Approximately 32% of the microfinance loans went towards agricultural production, of which about 70% were for livestock purchases and 30% for crop production.

Creating new financial institutions to fill Afghanistan's small and medium size enterprises financing void was an appropriate endeavor, and through time these institutions can be expected to expand their operations and make substantive contribution to the rebuilding of agricultural markets in Afghanistan.

IV. IMPACT BY COMMODITY GROUP

RAMP involved a number of different technical activities, described in the preceding section, all designed to address the strategic objective of increasing the marketable value of agricultural products by $250 million. Excluding benefits from those crops which were not part of the contract, including the benefit from Nangarhar emergency seed and fertilizer distribution and road-induced benefits to transport operators, the aggregate impact value from the five commodity groups is $1.646 billion. About 38% of this benefit is accrued from wheat and grains, followed by vegetables with 29%. Impact from fruit and livestock and poultry sub-sectors accounts for about 16% each. The nut sector has the lowest share, mainly because it will take time before Afghanistan regains the comparative advantage it once enjoyed in the international nut trade.

Measured against the intermediate targets, all the product line items have surpassed the contractual obligation. Benefits from fresh and dried vegetables have exceeded the target by 24 fold, wheat and other grains by 21 fold, livestock by 5 fold and fruits by about 3 fold.



Overall, RAMP has surpassed its contractual obligation by six-and-half fold, with a return on investment ratio of 11:1.

The sub-sector activities have inevitably benefited a number of other crops, like cotton, sugarcane in Nangarhar, sesame and other oil seeds. With rehabilitation of rural roads, vehicle operating costs have gone down, benefiting transport operators. RAMP has also undertaken an emergency wheat seed and fertilizer distribution to increase food production in Nangarhar province. If these 'residual' benefits were to be included to the benefit accrued from product line items, the cumulative RAMP-induced impact will be $1.746 billion.

V. IMPACT BY TECHNICAL SECTOR

Infrastructure, most notably irrigation, accounts for 68% of the total impact. Agriculture, through the various sub-sector activities, has contributed 32% to the impact. The rural finance sector has promoted marketing and processing activities to the value of $1.89 million, under 1%. The impact of rural finance will be much higher as the microfinance funds revolve and the banks begin to operate at higher level of lending intensity.

VI. CONCLUSION

RAMP has made substantial contribution to the development of Afghanistan's agricultural economy. The interventions were well conceived and constituted solid foundations for the achievement of USAID objectives in Afghanistan. It has pursued a well-defined sectoral and geographic approach in which activities were integrated to generate the imputed impact value.

Needless to say, despite the tremendous achievement of RAMP during the three years work, agriculture in Afghanistan has yet to 'take-off' and there are communities that are not able to market what they produce for lack of infrastructure. The country is still food insecure and employment and income opportunities are limited. A great deal of work also remains to be done in the sphere of capacity building and training of the MAI personnel, in which a start has been made but continuing efforts are necessary to consolidate the investments to date. Looking ahead to a possible second phase, project activities should constitute a constructive use of the RAMP resources in Afghanistan, consolidating what has been achieved thus far and supporting new opportunities. It is also recommended that project activities should be flexible for modification during implementation in response to changes in the operating environment. Critical activities should be implemented across project sites to deepen synergy for a maximum impact.

ANNEX A: ECONOMIC IMPACT OF RAMP

Technical Sector/Sub-sector	RAMP 5 Priority Commodity Groups					Other Benefits		TOTAL RAMP IMPACT		
	1) Fresh & Dried Fruit	2) Fresh & Dried Vegs	3) Nuts	4) Livestock & Poultry	5) Wheat & Grains	Other Crops	Other Benefits	Total by Product	Percent (%)	Grand Total
Agriculture Sector										
Demonstration Fields	21.22	28.33	0.00	0.00	40.20	0.00	0.00	89.748	**5.5%**	89.75
Cold Rooms	1.37	0.00	0.00	0.00	0.00	0.00	0.00	1.37	**0.1%**	1.37
Marketing of Fruit and Vegetables	3.32	1.16	0.082	0.00	0.00	0.00	0.00	4.562	**0.3%**	4.56
Locust Control	28.94	15.92	15.92	0.00	83.93	0.00	0.00	144.71	**8.8%**	144.71
Sunnpest Control	0.00	0.00	0.00	0.00	26.57	0.00	0.00	26.57	**1.6%**	26.57
Livestock	0.00	0.00	0.00	231.68	0.00	0.00	0.00	231.68	**14.1%**	231.68
Poultry	0.00	0.00	0.00	24.87	0.00	0.00	0.00	24.87	**1.5%**	24.87
Sub-total Agriculture Sector:	**$54.85**	**$45.41**	**$16.00**	**$256.55**	**$150.70**			**$523.510**		
Infrastructure Sector										
Irrigation	208.52	430.59	0.00	0.00	461.15	90.49	0.00	1100.26	**66.8%**	1,190.75
Roads	2.79	6.23	0.016	0.00	9.26	0.78	9.48	18.30	**1.1%**	28.56
Sub-total Infrastructure Sector:	**$211.31**	**$436.82**	**$0.02**	**$0.00**	**$470.41**	**$91.27**	**$9.48**	**$1,118.556**		
Rural Finance Sector										
Micro-Finance	0.17	0.08	0	1.17	0.25	0.00	0.00	1.67	**0.1%**	1.67
Small and Medium Enterprise	0	0.05	0	0.02	0.15	0.00	0.00	0.22	**0.0%**	0.22
Sub-total Rural Finance Sector:	**$0.17**	**$0.14**	**$0.00**	**$1.19**	**$0.40**			**$1.897**		
Emergency Input Supply, Nangarhar	0.00	0.00	0.00	0.00	2.00	0.0	0.00	2.00	**0.1%**	2.00
Total Impact:	**$266.330**	**$482.363**	**$16.018**	**$257.742**	**$623.510**	**$91.270**	**$9.480**	**$1,645.963**	**100%**	**$1,746.713**
Percentage Share of Total Impact	**16.2%**	**29.3%**	**1.0%**	**15.7%**	**37.9%**			**100.0%**		
Achievement Against Target (times)	**2.7**	**24.2**	**0.3**	**5.2**	**20.8**			**6.6**		

Notes:

1. Impact by product line measures benefits for the five line items (fresh and dried fruit, fresh and dried vegetables, nuts, livestock and poultry, and wheat and grains), which constituted the contractual basis but excludes benefit from Nangarhar emergency seed and fertilizer distribution.
2. The column "other crops" refers to benefits from crops which have been promoted, like cotton and oil seeds, but do not constitute the contractual target.
3. To disaggregate the benefit from locust control into product lines, the following shares, derived from national averages, were applied: fresh and dried fruit 20%; fresh and dried vegetables 11%; nuts 11%; and wheat and grains 58%.
4. To disaggregate benefits from roads into product lines, the share of crops in the total output value were derived from the analysis of agriculture production for treated and control villages. This crop-specific share was multplied by the imputed net benefit from reduced spoilage, fares, rates and travel time savings (assuming these are benefist foregone to producers without rehabilitation) and then aggregated by product line. The column "other benefits" refers to benefits accrued to transport operators by way of reduced vehicle operation cost due to rehabilitation of roads. This assumes that there is specialisation between producers and transpor operators.
5. Distribution of benefits from rural finance is based on loan disbursement ratios for SMEs and MFI
6. Achievement against target, measures impact against intermediate results as presented in 2004 RAMP strategy document (e.g. Fresh & Dried Fruit $266.334 million is 2.7 times the contracted $100 million)